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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,310	11/23/2001	Kunio Doi	215808US20	2678

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EXAMINER

MILLER, MARTIN E

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 10/27/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/990,310

Applicant(s)

DOI ET AL.

Examiner

Martin Miller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13 and 14 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 & 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The examiner has considered the IDS filed February 25, 2002 and March 17, 2003 and an initialed copy of each is included with this office action.

### ***Drawings***

2. The Examiner has found the drawings filed February 06, 2002 acceptable for examination purposes.

### ***Claim Objections***

3. Claim 12 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other complete claims in the alternative only. Claim 12 refers to the "any one of the steps of claims 1-11", not to any one of the claims 1-11. See MPEP § 608.01(n). Accordingly, the claim 12 has not been further treated on the merits.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Doi et al., US 2002/0172403 (hereinafter Doi).

The applied reference has common inventors with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C.

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102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

As per claim 1, Doi teaches:

obtaining at least one computed tomography medical image of the pulmonary nodule [0027];

obtaining at least one patient feature (age, [0078] or sex, [0089]) of a patient;

extracting image features [0067] of the pulmonary nodule from the at least one computed tomography medical image;

evaluating whether the pulmonary nodule is malignant based on an examination of a total of seven [0086]-[0097] of the patient or image features.

As per claim 2, Doi teaches:

wherein the step of obtaining at least one computed tomography medical image comprises obtaining a medical X-ray image [0110].

As per claim 3, Doi teaches:

wherein the step of obtaining at least one computed tomography medical image comprises obtaining at least one low-dose computed tomography image [0085].

As per claim 4, Doi teaches:

wherein the step of obtaining at least one patient feature comprises obtaining at least one of sex [0089] and age [0078] of the patient having the pulmonary nodule [0085].

As per claim 5, Doi teaches:

identifying image features based on an outline of the at least one computed tomography medical image of the pulmonary nodule [0037];

identifying image feature based on linear patterns of the at least one computed tomography medical image of the pulmonary nodule [0037], [0073], [0075], [0093];

identifying image feature based on edge orientation of an edge gradient ([0068] edge magnitude and direction); of the at least one computed tomography medical image of the pulmonary nodule

identifying image feature based on gray-level distribution [0035] of the at least one computed tomography medical image of the pulmonary nodule;

identifying image feature based on gray-level distribution of an edge gradient [0069] of the at least one computed tomography medical image of the pulmonary nodule;

identifying image feature based on the relationship between two histograms in the inside and outside regions of the segmented nodule [0064] of the at least one computed tomography medical image of the pulmonary nodule;

identifying image feature based on the relationship between two histograms in the inside and outside regions of the segmented nodule of an edge gradient [0064] of the at least one computed tomography medical image of the pulmonary nodule.

As per claim 6, Doi teaches at least one of the following steps:

identifying the effective diameter of the outline [0067]

As per claim 7, Doi teaches:

identifying the magnitude of line patterns for inside region of a segmented nodule of the medical image [0068]; and

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identifying the magnitude of line patterns for outside region of a segmented nodule of the medical image [0068].

As per claim 8, Doi teaches:

identifying radial gradient index computed by the mean absolute value of a radial gradient projected along a radial direction for the inside of a segmented nodule of the medical image [0068];

identifying radial gradient index computed by the mean absolute value of a radial gradient projected along a radial direction for the outside of a segmented nodule of the medical image [0068];

identifying tangential gradient index computed by the mean absolute value of a radial gradient projected along a radial direction for the inside of a segmented nodule of the medical image [0068];

identifying tangential gradient index computed by the mean absolute value of a radial gradient projected along a radial direction for the outside of a segmented nodule of the medical image [0068].

As per claim 9, Doi teaches:

the step of obtaining the patient features consist of obtaining the sex of the patient [0064];  
and

the step of extracting image features consists of extracting image features consists of extracting effective diameter of the pulmonary nodule [0067], contrast of the pulmonary nodule [0046], overlap measure of two gray-level histograms for the inside and outside regions of a segmented nodule of the medical image [0069], overlap measure of two gray-level histograms of

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the inside and outside region of a segmented nodule of an edge gradient of the medical image ([0064] and [0069], radial gradient index for an inside region of a segmented nodule of the medical image [0068], and peak value of a histogram for an inside regions of a segmented nodule of an edge gradient of the medical image ([0069] and [0088]).

As per claim 10, Doi teaches:

wherein the step of extracting image features consists of extracting the effective diameter of the pulmonary nodule [0087] and the contrast of the pulmonary nodule [0078].

As per claim 11, Doi teaches:

obtaining three medical images (Fig. 10, S60); and

the step of evaluating if the pulmonary nodules are malignant is based on the examination of the three medical images (fig. 10, S80).

As per claim 13, it depends upon any of the rejected claims above and analogous remarks apply.

As per claim 14, Doi teaches:

a means for obtaining a medical image of the pulmonary nodule (fig. 10, S10);

a means for obtaining patient features of a patient having the pulmonary nodule [0089];

a means for obtaining image features of the pulmonary nodule from the analysis of the medical image (fig. 10, S60).

### ***Remarks***

6. Claims 1-3, 6, 12-14 could have also been rejected under 35 U.S.C. 103(a) over the combination of Doi et al., US 5289374 and Ema et al., US 5779634. As Doi teaches most of the

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limitations regarding feature extraction and classifying nodules and Ema teaches collecting patient features (col. 1, ll. 25-30, Tables 6 and 7).

***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following U.S. patent(s) refer(s) to determining features in digital chest radiographs: Wilk, 5415167 and Doi et al., 5072384, 5668888, 5790690. The following U.S. patent(s) refer(s) to collecting patient feature data, in particular age and sex data: Wikswo, Jr. et al., 4079730, Classen, 6219674 and Ema et al., 5779634. The following WIPO publication teaches determining features in digital chest radiographs: Xu et al., W) 99/42950.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Miller whose telephone number is (703) 306-9134. The examiner can normally be reached on Monday-Friday, 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

*mem*  
mem  
10-14-03



**SAMIR AHMED  
PRIMARY EXAMINER**